Lamprotornis purpuropterus Rupell's Long-tailed Glossy Starling.
Clarke saw one at Hariff, near Hargeisa, between 19.iii.56 and 10.vi.56; and another there on 27.iii.58 which stayed around until 10.viii.58 at least. He says it frequented massive old acacia trees in the garden at Hariff. Its call was a noisy 'dar-ratt' repeated 6–8 times.

Petronia xanthosterna Yellow-spotted Petronia.
Clarke saw this bird at Sheikh, Wagar and Burao and westwards from there to Gebile.

Vidua macroura Pin-tailed Whydah.
Clarke saw about 20 in a tug-side garden at Amoud, 24.v.58, about half of them males in breeding plumage.

Acknowledgements: I am particularly grateful to my friend Gordon Clarke who has allowed me to make free use of his excellent notes, without which this exercise would scarcely have been worthwhile. I also wish to thank my son, Dr. John Baird, for allowing me access to his notes, for his helpful comments and for checking the typescript.

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The avifauna of the exotic pinewoods of Viti Levu, Fiji Islands

by Martyn L. Gorman

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Introduction

The volcanic island of Viti Levu is divided into 2 by mountains running north–south. These mountains interrupt the prevailing southeast winds leading to heavy rain on the windward side and leaving the leeward land dry for most of the year.

The windward, wet areas are covered in tropical rainforest, while the dry side of the island is covered in grassland with remnants of a sclerophyll forest largely removed in the 19th century.

Over the next 3 decades the Fijian vegetation will be profoundly changed by forestry practice. The rainforest will be altered, by selective felling, at an increasing rate while some 55,000 ha of grassland will be planted with the exotic *Pinus caribea*. Such forestry practice may have far reaching consequences for the avifuna of Fiji. This paper reports on the native and introduced birds of Fiji which have managed to colonise pine plantations, both those on former rainforest and those on dry grasslands.

Study areas

Pine has been planted on the Nadarivatu plateau (Fig. 1) since about 1950. The initial plantings were on the site of logged rainforest, the remaining trees of which were poisoned with arsenic. Pine has been planted in this way at various times along the valleys of the Navai, Nadala and Nukunuku and along the top of the escarpment south of Koro-O.

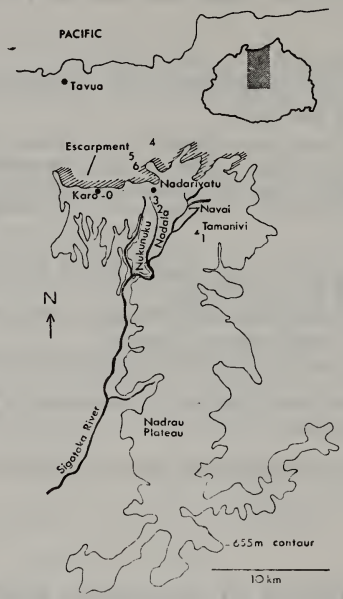

Fig. 1. Map showing the study areas 1–6. The shading on the small map of Viti Levu indicates the area covered by the large map.

In addition pine has been planted on dry grasslands where the Nukunuku joins the Sigatoka river and on the steep slopes of the escarpment leading down from Nadarivatu to the coastal plains.

I chose 4 major categories of pine: young plantations under 2 m in height in rainforest and on grassland; and mature pine more than 7 m on the same 2 vegetation types. On poisoned rainforest the young pine had a rich understorey of herbs, bushes and seedlings; the mature forest had a closed canopy and the understorey was much shorter and less diverse. On the dry land, both immature and mature pine had an understorey of grasses and shrubs. The natural vegetation surrounding these plantations is described fully in Gorman (1975).

Methods

The locations of the 6 study areas, covering the 4 categories of pine plantation and areas of natural grassland and rainforest are shown in Fig. 1. Each area was visited for a total of 31 days between November 1970 and May 1973. On each visit I walked irregularly through the area, from 6 a.m. to

10 a.m. and from 4 p.m. to 6 p.m. noting the species present on the basis of visual sightings and sound. In this way each of the 6 areas received a total of 186 hours of study. Relative abundances of the different species could not be estimated because the problems of observation varied greatly between species and between habitats.

Results

Of Vitu Levu's 55 species of birds, 47 indigenous and 8 introduced, I saw 41; their habitat occurrence is shown in Table 1.

TABLE 1

Field records of birds of Viti Levu, listed by study area (see map) to show the effect of exotic pine plantation.

	Study Area					
	Rain forest	*Former*	*Rain forest*	*Grassland*	*Former*	*Grassland*
Species	1. *Virgin*	2. *Young Pine*	3. *Mature Pine*	4. *Virgin*	5. *Young Pine*	6. *Mature Pine*
Fiji Goshawk *Accipter rufitorques*	x	x		x	x	
Swamp Harrier *Circus approximans*	x			x		
Many coloured Fruit Dove *Ptilinopus perousii*	x					
Golden Dove *Ptilinopus luteovirens*	x					
Peales Pigeon *Ducula latrans*	x					
White-throated Pigeon *Columba vitiensis*	x					
Friendly Ground Dove *Gallicolumba stairii*	x					
Red-throated Lory *Vini amabilis*	x					
Collared Lory *Phigys solitarius*	x					
Musk Parrot *Prosopeia personata*	x					
Fan-tailed Cuckoo *Cacomantis pyrrophanus*	x			x		
Barn Owl *Tyto alba*	x			x		
White-rumped Swiftlet *Collocalia spodiop gia*	x	x		x	x	
White-collared Kingfisher *Halcyon chloris*	x	x	x	x	x	x
Polynesian Triller *Lalage maculosa*	x	x	x	x		x
Island Thrush *Turdus poliocephalus*	x					
Fiji Warbler *Vitia ruficapilla*	x					
Spotted Fantail *Rhipidura spilodera*	x	x	x			
Slaty Flycatcher *Mayrornis lessoni*	x					
Fiji Shrikebill *Clytorhynchus vitiensis*	x	x	x			
Black-faced Shrikebill *Clytorhynchus nigrogularis*	x					
Vanikoro Broadbill *Myiagra vanikorensis*	x	x	x	x	x	x
Blue-crested Broadbill *Myiagra azureocapilla*	x					
Scarlet Robin *Petroica multicolor*	x	x	x	x	x	x
Golden Whistler *Pachycephala pectoralis*	x	x				
White-breasted Wood-swallow *Artamus leucorhynchus*	x	x		x	x	
Polynesian Starling *Aplonis tabuensis*	x	x				
Orange-breasted Honey-eater *Myzomela jugularis*	x	x		x	x	
Wattled Honey-eater *Foulehaio carunculata*	x			x	x	
Giant Forest Honey-eater *Gymnomyza viridis*	x					
Layard's White-eye *Zosterops explorator*	x	x		x	x	
Grey-backed White-eye *Zosterops lateralis*	x	x		x	x	
Red-headed Parrot-finch *Erythrura cyanovirens*	x	x		x	x	
Pink-billed Parrot-finch *Erythrura kleinschmidti*	x					
Quail *Synoicus australis*				x		
Malay Turtle Dove *Streptopelia chinensis*				x		
Dusky Myna *Acridotheres tristis*				x	x	
Jungle Myna *Acridotheres fuscus*				x	x	
Red-vented Bulbul *Pycnonotus cafer*	x	x	x	x	x	x
Strawberry Finch *Amandava amandava*				x	x	
Java Rice-sparrow *Padda oryzivora*				x		
TOTALS	35	16	7	22	15	5

Discussion

It is clear from Table 1 that not all the birds present in rainforest manage to colonise the pine in the rainforest. In general the pigeons, parrots and lories are absent. Of the passerines, those species spread widely across the Pacific are present in the pine, while the Fijian endemics and those with restricted geographical ranges are absent. Of the introduced species only the Red-vented Bulbul *Pycnonotus cafer* has reached the Nadarivatu plateau and it is common in the pine. Comparing mature and immature pine there is a

marked decrease in the number of species present in older forest. In general the species lost are those which make use of the profuse understorey of the immature plantations—the honeyeaters, white-eyes and parrot-finch.

Most of the species present on the grasslands are also present in the young grassland pine plantations. However as the pine matures and the understorey becomes more sparse one sees again a reduction in the diversity of the avifauna. The reduction again involves the birds relying on the understory, and only the insectivorous species are left—the predatory White-collared Kingfisher *Halcyon chloris*, the Polynesian Triller *Lalage maculosa*, the Vanikoro Broadbill *Myiagra vanikorensis*, the Scarlet Robin *Petroica multicolor* and the Red-vented Bulbul *Pycnonotus cafer*.

In general, therefore the replacement of natural or semi-natural vegetation with pine leads to a progressive reduction in the diversity of the avifauna.

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Natal pterylosis of three *Thraupis* tanagers

by J. Ingels

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Data on natal down of tanagers (Thraupinae) are restricted to a few species only: *Piranga olivacea* (Wetherbee 1958) and *Thraupis palmarum* and *Euphonia violacea* (Collins 1963). This paper presents information on distribution and number of neossoptile sin 3 species of *Thraupis*: the Blue-grey Tanager *T. episcopus*, the Palm Tanager *T. palmarum* and the Sayaca Tanager *T. sayaca*.

Neossoptiles were counted on nestlings hatched under controlled conditions and taken from the nest within 24 hrs after hatching (stage A of Wetherbee 1957). Counts were made of damp neossoptiles under a microscope using a dissection pin as a pointer and preener. There were 5 *episcopus*, 2 *palmarum* and one *sayaca* specimens available. One breeding pair only was involved for each species. Nomenclature of pterylae follows Wetherbee (1957) but equivalent terminology of Collins (1963) for some tracts is indicated. Secondary coverts were not divided into greater, middle and lesser ones. The taxonomic arrangement is that of Peters (1970).

Neossoptiles of *sayaca*, *palmarum* and *episcopus* are blackish, dark grey and light grey respectively. An empirical impression of the total amount of natal down is: abundant in *episcopus*, moderate in *palmarum* and sparse in *sayaca*. This impression is caused by the difference in total neossoptile number, in length of neossoptiles (Table 1) and in number of barbs of each neossoptile.

All neossoptiles from these tanagers have a similar structure: a very short, reduced rachis ending in from 1 to 15 barbs with barbules. The number of